CORNEAL TRANSPLANTATION

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THE recent outbreak of sensational newspaper accounts of corneal transplantation will result in a flood of inquiries to the profession from the blind and near-blind throughout the country. The recent statement in an Associated Press release that 250,000 blind may have their sight restored, has already brought forth a voluminous correspondence from the friends and relatives of unfortunates, blind from advanced glaucoma, optic atrophy, and other hopeless conditions. It is important, therefore, that every physician should be acquainted with the possibilities and limitations of the operation.

Corneal transplantation was first attempted a little more than one hundred years ago. The first description in the English language was written by S. L. Bigger in the Dublin *Journal of Medical Sciences* in 1837. In the absence of anesthetics, aseptic technique, and adequate instruments the early attempts were universally unsuccessful, and the transplantation of corneal tissue, with maintenance of transparency, was regarded as impossible until Von Hippel in 1878 described a technique which resulted in a number of temporarily transparent grafts. The first permanently successful transplant was described in 1907. Since that time, with constant improvements in technique, and with experimental work to determine the conditions necessary for successful transplantation, it has become possible to state that such transplantation undertaken in suitable cases is a practical procedure.

The conditions for which such an operation may be performed are very limited and constitute only a very small percentage of the causes of all blindness. The conditions *under* which such an operation *should* be performed further limit this small group. The transplantation of cornea is useful only in those individuals in whom the cornea has become opaque through disease or injury and in whom the remaining ocular structures are in good condition. This excludes the large number of blind with glaucoma, detached retina, atrophy of the optic nerve, inflammatory diseases of the retina, and choroid and pupillary membranes following severe iritis. The presence of a cataract is not in itself a contraindication to transplantation of the cornea, but makes the operation much more difficult and naturally reduces the chance of success. The operation should not be done in an individual who has one sound eye and should not be done, in my opinion, in a one-eyed individual whose vision is 1/10 or better, since the resultant visual acuity is in the majority of successful cases only 1/10. It is, then, an operation to be reserved for a small number of desperate cases. One could estimate that in San Francisco and its vicinity not more than a dozen such individuals would present themselves.

Several hundred such operations have now been performed in all parts of the world, and it is possible to state what results may be expected. The transplanted tissue will take in 80 per cent of cases (those eyes in which it does not take are usually lost). About 25 per cent of all grafts which take remain transparent with improvement in vision from 1/10 to 9/10. The remainder become opaque. It may be said, in general, that a properly selected case has a 25 per cent chance of getting useful vision and a 50 per cent chance of improvement. The best results are obtained in cases of corneal opacity following interstitial keratitis, in which as high as 75 per cent successful transplants have been reported. In opaque leukomas, due to other diseases, the incidence of improvement after transplantation is less than 10 per cent. It is generally recognized that the more normal corneal tissue there is present in the bed the greater the chance of success. The more fibrous tissue the less the chance of success.

Corneal tissue for grafting may be taken (1) from living eyes enucleated for such reasons as intraocular tumor, severe injuries, patients in whom the cornea is healthy; (2) from eyes of stillborn infants; (3) from the eyes of cadavers. In the last two cases the eye must be used within an hour after death or may be preserved by freezing at 3 degrees centigrade for use within three days. It is believed that the younger the donor the better the tissue is for grafting, and that the cornea of a stillborn has greater viability than that from other sources. This fact, together with the greater ease of obtaining and preserving the tissues of infants makes this source the most desirable if suitable living eyes are not available. Compatibility of blood groups appears to have no bearing on the outcome. If one considers the fact that the number of candidates in this country is very small, and that at least two grafts may be taken from any one eye, the need for preserved material does not appear great.

Numerous techniques have been advocated. The one which is finding general acceptance at present is that of partial penetrating keratoplasty. In this operation a square or disc, about 4-5 millimeters in diameter and of the entire corneal thickness, is removed from the center of the opaque cornea and replaced by a corresponding section from the donor cornea. The graft is held in place by conjunctival flaps or by fine silk bridle sutures which are anchored in the surrounding cornea and merely pass over the graft to prevent its displacement. Beveling the margins of the graft inward provides a broader nutritional surface, and at the same time prevents the graft from falling into the anterior chamber. Vascularization of the graft disposes to its opacification. An avascular graft which takes is apt to remain clear. The grafted tissue is for a long time insensitive and must be protected much like an anesthetic cornea. The period of hospitalization is usually three to four weeks, and during at least the first week special nursing is needed to prevent any exertion or sudden movement on the part of the patient which might dislodge the graft. The financial burden is, therefore, considerable.

If a graft has taken but has become opaque, a second graft may be attempted after a suitable interval. It sometimes happens that the first graft becomes partly opaque, but at the same time provides a more suitable ground for a second transplant, which will give improvement in vision.

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